INDIANA DEPARTMENT OF TRANSPORTATION
MATERIALS AND TESTS DIVISION

CERTIFIED VOLUMETRIC HOT MIX ASPHALT PRODUCER PROGRAM
ITM 583-02P

1.0 SCOPE.

1.1 This procedure covers the requirements for a HMA plant to become a Certified Volumetric Hot Mix Asphalt Producer. Mixtures produced shall be QC/QA HMA in accordance with 401 and HMA in accordance with 402.

1.2 The values stated in either English or acceptable SI metric units are to be regarded separately as standard, as appropriate for a specification with which this ITM is used. Within the text, SI metric units are shown in parenthesis. The values stated in each system may not be exact equivalents; therefore each system shall be used independently of the other, without combining values in any way.

1.3 This ITM may involve hazardous materials, operations, and equipment. This ITM does not purport to address all of the safety problems associated with its use. It is the responsibility of whoever uses this ITM to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2.0 REFERENCES.

2.1 Documents required by the Program may be maintained electronically or by hard copy.

2.2 AASHTO Standards.

T 27	Sieve Analysis of Fine and Coarse Aggregates
T 40	Sampling Bituminous Materials
T166	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens.
T 209	Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
T 255	Total Moisture Content of Aggregate by Drying
T275	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
T 287	Asphalt Cement Content of Asphalt Concrete Mixtures by the Nuclear Method
T 312	Preparing and Determining the Density of Hot Mix Asphalt (HMA) Specimens by Means of the SHRP Gyratory Compactor

2.3 ASTM Standards.

D 5821	Determining the Percentage of Fractured Particles in Coarse Aggregate

2.4 ITM Standards.

207	Procedures for Sampling Stockpiled Aggregates
571	Quantitative Extraction of Asphalt/Binder and Gradation of Extracted Aggregate from HMA Mixtures
572	Drying HMA Mixtures
578	Qualification of a Surge Bin for Extended Storage
580	Sampling HMA
586	Binder Content by Ignition
587	Reducing HMA Samples to Testing Size
902	Verifying Sieves
903	Verifying Ovens
905	Verifying Vacuum Systems
906	Verifying Mechanical Shakers
908	Verifying Calibrations Settings for Superpave Gyratory Compactors
909	Verifying Thermometers
910	Verifying Balances

2.5 A Certified HMA plant laboratory shall have the following current documents on file:

- **(a)** Indiana Department of Transportation Standard Specifications (Includes applicable Supplemental Specifications),
- **(b)** Pertinent contract Special Provisions,
- **(c)** Indiana Hot Mix Asphalt Quality Assurance Certified Technician Program Manual,
- **(d)** All applicable INDOT, AASHTO, and ASTM Test Methods,
- **(e)** Testing equipment calibrations or verifications,
- **(f)** Mix design, DMF, and JMF for each Mixture,
- **(g)** Fines correction data for each DMF and JMF if applicable,
- **(h)** Process control test results, and
- **(i)** Control charts.

2.6 A Certified HMA plant shall have the following current documents on file:

- **(a)** The Volumetric Quality Control Plan (VQCP) for the HMA plant,
- **(b)** Binder certifications from an Approved Supplier Certification producer,
- **(c)** Instructions from the manufacturer concerning storage and handling of the binder,
- **(d)** HMA plant calibrations for each DMF,
- **(e)** Temperature recordation charts of the aggregate or mixture,

(f) Daily diary, and
(g) Calibration of HMA plant scales and verification of meters.

3.0 TERMINOLOGY.

3.1 Terms and Abbreviations. Definitions for terms and abbreviations will be in accordance with the Department's Standard Specifications Section 101 and the following:

3.2 Addenda. Any addition or deletion to the VQCP. An addenda summary sheet shall be maintained to reflect all changes to the VQCP identifying the change, date of occurrence, and date approved. Changes may be made with verbal approval from the DMTE with a written follow up.

3.3 Actual Binder Content. The binder content determined in accordance with ITM 586 or the total of the binder content determined in accordance with ITM 571 and the binder absorption percent from the DMF.

3.4 Certified HMA Plant. A HMA plant that meets the requirements of the Program, continues to be under the same ownership, and is approved by the Department.

3.5 Corrective Action. Corrective action shall include, but is not limited to, investigation for cause, correction of known cause, or re-testing.

3.6 Coarse Aggregate. Aggregate that has a minimum of 20 percent retained on the 4.75 mm sieve.

3.7 District. The Department District Office responsible for administrating the materials and tests function in a local area of the state.

3.8 Division. The Materials and Tests Division of the Indiana Department of Transportation, located at 120 S. Shortridge Rd. in Indianapolis, Indiana 46219-0389.

3.9 Fine Aggregate. Aggregate that is 100 percent passing the 9.5 mm sieve and a minimum of 80 percent passing the 4.75 mm sieve.

3.10 Mixture. QC/QA HMA or HMA produced for the Department's use in accordance with the ITM for the Certified Volumetric Hot Mix Asphalt Producer Program and the Specifications.

3.11 Moving Average. Average of the last four or five tests as stated in the VQCP.

3.12 Producer. A company or owner who shall assume responsibility for a Certified HMA Plant.

3.13 Program. The Department ITM for the Certified Volumetric Hot Mix Asphalt Producer Program.

3.14 Qualified Technician. An individual who has successfully completed the written and proficiency testing requirements of the Department Qualified Laboratory and Technician Program.

4.0 SIGNIFICANCE AND USE. The Certified Volumetric Hot Mix Asphalt Producer Program is a program whereby the Producer takes responsibility for all aspects of the production of quality Mixture in accordance with contract requirements, and the Department monitors the Producers production, sampling, and testing procedures.

5.0 PRODUCER PERSONNEL. The Producer personnel shall include a Management Representative and a Certified Asphalt Technician.

5.1 Management Representative. The Management Representative shall be responsible for all aspects of production and control required by the Program at a HMA Plant and coordination of the requirements of the VQCP of the mixture on the pavement.

5.2 Certified Asphalt Technician. A Certified Asphalt Technician is a Producer or Consultant employee who has been certified by the Department.

The Certified Asphalt Technician shall compact and analyze the Mixture specimens, and perform the maximum specific gravity test. The technician shall supervise all other sampling and testing of materials, the maintenance of control charts, and the maintenance of the diary. A Certified Asphalt Technician that is also a Qualified Technician shall conduct all sampling and testing used for acceptance of materials.

6.0 LABORATORY.

6.1 Process control testing shall be performed at the HMA Plant or as permitted in 6.2. The Producer shall provide and maintain a laboratory for process control testing. The laboratory shall have the necessary space, equipment, and supplies for the tests to be performed. The laboratory testing equipment shall meet the requirements of the test methods identified for the required sampling and testing, except that an electronic balance shall be provided. The electronic balance shall be readable to 0.1 g and accurate to 0.2 g or 0.1 percent of the test load, whichever is greater, at any point within the range of use. The gyratory compactor shall be on the Department's List of Approved SHRP Gyratory Compactors.

6.2 Performance of process control tests at laboratory facilities other than at the HMA Plant will be permitted provided that all test procedure criteria are satisfied, and the test results are furnished in writing to the HMA Plant within 48 h of sampling.

6.3 The Engineer shall be permitted access to inspect any laboratory used for process control testing, and witness process control activities during production of Mixtures.

7.0 TEST EQUIPMENT CALIBRATION.

7.1 The test equipment furnished by the Producer shall be properly calibrated or verified and maintained within the limits described in the applicable test method.

7.2 The Producer shall calibrate or verify equipment at the frequency indicated.

Equipment	Requirement	Minimum Frequency	Procedure
Balances	Verification	12 mo.	ITM 910
Gyratory Compactor	Verification	1 mo.	ITM 908
Ignition Oven	Calibrate	Each Mix	ITM 586
Mechanical Shakers	Check Sieving Thoroughness	12 mo.	ITM 906
Nuclear Asphalt Content Gauge	Calibrate	Each Mix	AASHTO T287
Ovens	Verify Temperature Settings	6 mo.	ITM 903
Sieves	Check Physical Condition	6 mo.	ITM 902
Thermometers	Verification	6 mo.	ITM 909
Vacuum Pump	Check Pressure	12 mo.	ITM 905
Volumetric Flask	Calibrate	1 mo.	AASHTO T209

7.3 The equipment calibration or verification documentation shall include:

- **(a)** A description of the equipment calibrated or verified including Model and Serial Number,
- **(b)** Name of the person performing the calibration or verification,
- **(c)** Identification of the calibration equipment used, if any (namely, standard weights, proving rings, thermometers, etc.),
- **(d)** Last date calibration or verification was performed and next due date,
- **(e)** A reference to the procedure used, and
- **(f)** Detailed records showing the results of the calibration or verification performed.

8.0 DIARY.

8.1 The Producer shall maintain a diary at the HMA Plant. The diary shall be an open format book with at least one page devoted to each day Mixture is produced.

8.2 The Producer shall keep the diary on file for a minimum period of three years.

8.3 Entries in the diary shall as a minimum include:

(a) The quantity of Mixture produced, DMF or JMF number, and the contract or purchase order number for each Mixture,

(b) The time the sample was obtained and the time the test was completed,

(c) Non-conforming tests and the resulting corrective action taken, and

(d) Any significant events or problems.

8.4 The Certified Asphalt Technician or Management Representative shall sign the entry in the diary. On occasion it may be signed by another person; however, it must then be counter-signed by the Certified Asphalt Technician or Management Representative.

9.0 MATERIALS SAMPLING AND TESTING. The Producer shall designate the sampling and sample reduction procedures, test methods, sampling locations, and size of samples necessary for the quality control. Mixture shall be sampled in accordance with ITM 580. Testing of the samples shall be completed within 48 h of the time the sample was taken. Test values shall be reported to the nearest 0.1 percent, except for the coarse aggregate angularity content and temperature of mixture, which shall be reported to the nearest 1 percent and 1^0 F (2^0 C)respectively. Rounding shall be in accordance with 109.01(a). The Producer shall keep the test results on file for a minimum period of three years.

The VMA shall be calculated using the Actual Binder Content determination. Gyratory specimens and uncompacted mixture for the maximum specific gravity test shall be made available to the DMTE if the contractor requests an appeal.

9.1 QC/QA HMA Mixtures. The following items shall be addressed in the VQCP as a minimum:

(a) Aggregates
- **1.** Stockpile
- **2.** Blended

(b) Binder

(c) Recycled Materials
- **1.** Binder Content
- **2.** Gradation
- **3.** Moisture
- **4.** Coarse Aggregate Angularity

(d) Mixture Sampled at the HMA plant
- **1.** Binder Content
- **2.** Moisture
- **3.** Temperature

(e) Mixture Sampled from the Pavement
- **1.** Air Voids
- **2.** VMA
- **3.** Actual Binder Content
- **4.** Moisture (for surface mixtures only)

9.2 HMA Mixtures. HMA mixture produced concurrently with QC/QA HMA mixture shall be sampled and tested in accordance with 9.1. All other HMA mixture shall be sampled at the HMA plant or the roadway at the contractor's option and tested for Binder Content, Coarse Aggregate Angularity for mixtures containing Gravel, Gradation, and Air Voids in accordance with the following minimum frequency:

(a) The first 250 t (250 Mg) and each subsequent 1000 t (1000 Mg) of each DMF or JMF in a construction season for base and intermediate mixtures

(b) The first 250 t (250 Mg) and each subsequent 600 t (600 Mg) of each DMF or JMF in a construction season for surface mixtures.

10.0 PRODUCTION.

10.1 The Producer shall detail as a minimum the following procedures:
- **(a)** Binder Management,
- **(b)** Aggregate Management,
- **(c)** RAP Management,
- **(d)** HMA Plant Calibration,
- **(e)** Mix Temperature Management,
- **(f)** Mix Moisture Management,
- **(g)** HMA Storage, and
- **(h)** Production/Placement Balance.

11.0 TRUCK MANAGEMENT.

11.1 The Producer shall detail as a minimum the following procedures:
- **(a)** Truck Bed Maintenance,
- **(b)** Truck Loading,
- **(c)** Tarping, and
- **(d)** Truck Unloading.

12.0 ADJUSTMENT PERIOD.

This only applies to QC/QA HMA mixtures.

12.1 The Producer will be allowed an adjustment period for each DMF in which changes can be made. The adjustment period shall be from the beginning of production and extending until 4000 t (4000 Mg) of base or intermediate mixtures or 2400 t (2400 Mg) of surface mixture has been produced. The production shall be for one contract. A reduced adjustment period may be allowed.

12.2 The amount passing all sieves on the DMF may be adjusted provided the gradation limits and the dust/calculated effective binder ratio do not exceed the requirements of 401.05. Adjustments to the gradation shall be included in the JMF.

12.3 The binder content on the JMF may be determined by adjusting the DMF a maximum of ±0.5 percent provided the dust/calculated effective binder ratio is in accordance with 401.05.

12.4 The VMA value on the JMF may be adjusted from the DMF provided the new value is in accordance with 401.05.

12.5 The JMF shall be submitted in writing for approval to the DMTE upon completion of the production of 6000 t (6000 Mg) of base or intermediate Mixture, 3600 t (3600 Mg) of surface Mixture, or a reduced adjustment period.

12.6 Only one adjustment period will be allowed for each DMF within a construction season. If production extends into the next construction season, the DMF/JMF will be allowed another adjustment period.

13.0 CONTROL CHARTS. This only applies to QC/QA HMA mixtures.

13.1 Control charts shall be maintained by the Producer at the HMA plant laboratory for each DMF and JMF. All control test results shall be recorded on the control charts the same day the tests are conducted. As a minimum the charts shall be maintained until 30 test data points have been plotted. Subsequent to that time at least 30 test data points shall be continuously displayed.

13.2 All charts shall be retained by the Producer for the HMA Plant for a period of three years.

13.3 Control charts shall be required for:

- **(a)** Critical sieve(s) for each aggregate size from stockpile samples as designated by the Producer. The Producer shall identify a minimum of one critical sieve.
- **(b)** Critical sieves for each blended aggregate as designated by the Producer. A minimum of four sieves for base and intermediate, and a minimum of three sieves for surface mixtures shall be identified by the Producer.
- **(c)** The target mean values for the binder content of the mixture for the DMF and JMF.
- **(d)** The target mean values for the air void content from mixture as identified by the Producer.
- **(e)** The target mean value for VMA as determined from the DMF and JMF.

13.4 Control limits from the target value shall be plotted on the control charts and shall be the following:

Parameter	Control Limits
	Single Test ±
Aggregate Stockpile Samples, % Passing Sieve	
1 ½ in. (37.5mm)	15.0
1 in. (25.0mm)	10.0
¾ in. (19.0mm)	10.0
½ in. (12.5mm)	10.0
#4 (4.75mm)	10.0
#8 (2.36mm)	10.0
#16 (1.18mm)	8.0
# 30 (600um)	6.0
#50 (300um)	6.0
#100 (150um)	6.0
#200 (75um)	2.0
Blended Aggregate, % Passing Sieve Base and Intermediate Mixtures	
1 ½ in. (37.5mm)	15.0
1 in. (25.0mm)	10.0
¾ in. (19.0mm)	10.0
½ in. (12.5mm)	10.0
#4 (4.75mm)	10.0
#8 (2.36mm)	10.0
#16 (1.18mm)	8.0
# 30 (600um)	6.0
#50 (300um)	6.0
#100 (150um)	6.0
#200 (75um)	2.0
Blended Aggregated, % Passing Sieve Surface Mixtures	
¾ in. (19.0mm)	10.0
½ in. (12.5mm)	10.0
#4 (4.75mm)	10.0
#8 (2.36mm)	8.0
#16 (1.18mm)	8.0
# 30 (600um)	4.0
#50 (300um)	4.0
#100 (150um)	3.0
#200 (75um)	2.0
Binder Content of Mixture, %	± 0.7
VMA @ Ndes %	± 1.0
Target Air Voids %	± 1.0

13.5 Chart Construction:

(a) The target mean value shall be represented by a heavy long dash followed by a short dash line,
(b) Control limits shall be represented by heavy solid lines,
(c) The horizontal lines on the chart indicating the control limit(s) and the target mean value shall be numerically identified in the left margin,
(d) The plot point for the test result shall be surrounded by a small circle and each consecutive point shall be connected by a solid straight line,
(e) The moving average of the most current five test values shall be plotted. The plot points shall be indicated by a small triangle symbol and connected by straight lines,
(f) Test results shall be plotted left to right in chronological order and dates corresponding to each test shall be shown along the horizontal axis,
(g) All values shall be plotted to the nearest 0.1 percent, and
(h) Test results for samples obtained from other than at the Certified HMA Plant may be plotted on the corresponding chart provided the points are not connected with the test results from the Certified HMA plant and the test results are not included in the moving average.

Any proposed deviation from these procedures shall be identified in the QCP.

14.0 RESPONSE TO TEST RESULTS.

14.1 The Producer shall take corrective action when the control limits for QC/QA HMA or specification limits for HMA Mixtures are exceeded for the appropriate properties of Aggregate Stockpiles, Blended Aggregate, Mixture Binder Content, Air Voids or VMA.

14.2 Moisture Content. The Producer shall take corrective action when the moisture content of the Mixture sampled at the HMA Plant exceeds 0.3 percent.

14.3 Documentation. All corrective action shall be documented in the diary.

15.0 VOLUMETRIC QUALITY CONTROL PLAN.

15.1 Each Producer providing Mixture under the Program shall have a written VQCP which shall be HMA plant specific and be the basis of control. The VQCP shall contain, but not be limited to, the methods of sampling, testing, calibration, verification, inspection, and anticipated frequencies.

15.2 The VQCP shall include the following information for each HMA Plant if applicable.

(a) The location of the HMA Plant site, including the county and reference to the nearest identifiable points such as highways and towns.
(b) The name, telephone number, duties, and employer of the Management Representative and Certified Asphalt Technician(s). The duties of all other personnel responsible for implementation of the VQCP shall be included.

(c) A list of test equipment that is calibrated or verified, the test methods and frequency of calibration or verification of the equipment, and a statement of accessibility of the laboratory to Department personnel. If the laboratory is not located at the HMA Plant, the location of the laboratory shall be designated, and the procedure for transporting the mixture to the laboratory included.

(d) A HMA plant site layout diagram which shall include the location of the stockpile area, binder tanks, fuel tank, additive or modifier supply, anti-adhesive supply, field laboratory, visitor parking area, and major components of the mixing HMA plant.

(e) A plan for controls of the aggregate and recycled material stockpiles. Controls for identification of stockpiles by signing or other acceptable methods, techniques for construction of proper stockpiles, and cold bin loading procedures shall be included.

(f) A plan for the use of more than one binder grade in a binder tank.

(g) The procedure for the consistent uniform addition of baghouse fines when returned into the mixing HMA plant.

(h) The procedure for using an anti-adhesive agent for the truck bed, and a statement that the agent is on the Department's List of Approved Anti-Adhesive Agents Materials.

(i) The procedure for sealing the surge bin when used for extended storage of the mixture. The written approval of the surge bin in accordance with ITM 578 shall be included.

(j) The procedure for loading Mixture into the trucks.

(k) A sampling plan that includes locations, test methods, devices, techniques, frequencies, and sample reduction procedures.

(l) A testing plan that includes the types of tests, and test methods.

(m) A description of any other process control techniques that may be used. These controls may include, but are not limited to:

- **1)** Different types of material testing, or
- **2)** Visual checks, and monitoring of HMA plant production.

(n) A statement of the procedure for handling addenda to the VQCP including a time schedule for submittal.

(o) A documentation plan with details on control charting, test data, and the diary. Copies of the forms may be included.

15.3 The last page of the VQCP shall contain two signatures. One signature shall be for the Producer and include: the Producer's Management Representative's signature, the date of submittal and the corporate title of the Producer's Management Representative making the signature. The other signature shall be for approval by the DMTE.

15.4 Production of Mixture shall not begin before the VQCP has been approved. The Producer shall submit three copies of the VQCP to the Department for review. Two copies shall be submitted to the DMTE, and the other copy to the Materials and Tests Division. Acceptance or rejection of the VQCP will be made within 15 days of receipt of the VQCP. One approved copy will be returned to the Producer.

15.5 The Producer shall transmit all applicable process control changes to the DMTE in a timely manner for approval. This shall be done in the format of addenda to the VQCP. Each page of the VQCP that is revised shall include the HMA plant number, date of revision, and means of identifying the revision. The addenda shall include a signature page as identified in 15.3.

15.6 Movement of the HMA Plant to a new location will require an addendum to the VQCP.

16.0 DEPARTMENT RESPONSIBILITIES.

16.1 The Department may conduct audits on a random basis of each HMA Plant.

16.2 The Department will maintain the List of Approved Certified Volumetric Hot Mixed Asphalt Producers.

16.3 The Department will administer a Certified Asphalt Technician Training Program for those Asphalt Technicians that perform the required duties for the Certified HMA Plant. Certification of the Technicians will be provided by the Department upon passing a certification test.

16.4 The removal of a supplier from the Department's List of Approved Certified Volumetric Hot Mixed Asphalt Producer Program will be the responsibility of the Chief of the Materials and Tests Division. The Producer shall have the right to appeal the removal from the Department's List of Approved Certified Volumetric Hot Mix Asphalt Producers to the Chief Engineer.